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EXAMINER

WANG, TED M

ART UNIT PAPER NUMBER

2634

DATE MAILED: 06/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/826,969

Applicant(s)

JOSHI ET AL.

Examiner

Ted M Wang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 April 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) 2 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 4-6 is/are allowed.
- 6) ☐ Claim(s) 1,3 and 7-12 is/are rejected.
- 7) ☒ Claim(s) 13-26 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 April 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>7</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-27 are pending in the application.

Drawings

2. Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawing sheets are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character

- "417" has been used to designate both LPF 131 output and Mixer 407 output in Fig.3.
- "409" has been used to designate both Tone tracking mixers/filters and phase detector in Fig.7b and 7c.

Corrected drawing sheets are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled

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"Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference character(s) mentioned in the description:

- Reference numbers 104 (page 12 line 11), 302 (page 12 line 3), and 320 (page 12 line 3) does not shown in Fig.3, and
- Reference number 402 (page 18 line 34) does not shown in Fig.6, and
- Reference number 550 (page 20) does not shown in Fig.7a and 7b, and
- Reference number 651 does not shown in Fig.7c, and
- Reference number 550 does not shown in Fig.7a and 7b, and
- Fig.8a-8c and Fig.9a-9c does not shown in Fig.8 and Fig.9.

Corrected drawing sheets are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawings are objected to because

- The reference number is missing for $e^{j\phi}$ box in Fig. 7a and 7b respectively.
- The drawing should label all the elements in the figures. For example, in Fig.10 409 should be labeled as Tone tracking mixers/filters; and 405 should be labeled frequency synthesizer; etc.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

5. The disclosure is objected to because of the following informalities:

- Page 12 line 11, changes "output104" to "output 104".
- Page 12 line 12, changes "FFT415" to "FFT 415".
- Page 12 line 28, changes "TTT" to "TT".
- Page 15 line 12 and page 16 lines 9-10, changes " $S(n) e^{j\phi(t)}$ " to " $e^{j\phi(t)}$ ".
- Page 15 line 16, changes " $fcS(n) e^{j\phi(t)}$ " to " $fc = S(n) e^{j\phi(t)}$ ".
- Page 16 line 20, changes "Fig.3" to "Fig.5".
- Page 18 line 7, changes " $e^{j\Phi(t)}$ " to " $e^{j\phi(t)}$ ".
- Page 20 line 8, changes " e^{j5} " to " $e^{j\phi(t)}$ ".
- Page 24 line 26, changes "601" to "607".

Appropriate correction is required.

Preliminary Amendment

6. The preliminary amendment filed on 01/04/2004 has been entered. Applicant cancelled claim 2 and added claims 3-27.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claims 8, 9, and 27 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

- In regard claim 8, the specification does not teach "the multi-carrier modulation receiver is disposed as an integrated circuit upon a substrate" as recited. The specification only discuss about "A current trend in circuit design is the increasing use of digital signal processing techniques (DSP) in implementing circuit designs. DSP is rapidly tending to replace the more conventional analog design techniques. Phase distortion, or phase errors, typically arise in analog circuitry such as IF and RF tuners. Single carrier techniques typically utilizes a DSP technique of processing decision data in order to combat phase distortion.

Decision data refers to the estimated value of a transmitted data sequence or symbol, based on received data.” as recited from page 10-11.

- In regard claim 9, the specification does not teach “and a multiplier having a first input coupled to the output of the training tone tracking PLL, a second input coupled to the training tone tracking circuit input, and ***an output coupled to an output of the training tone tracking circuit***”. The specification only describes “A training tone tracking circuit 420 accepts an input signal 417 and splits the signal into a first signal, and a second signal. The first signal is applied to a first input port of a mixer 407. The second signal is applied to a training tone 10 tracking PLL (135) (TT PLL). An output of the TT PLL (135) is applied to a second input port of the mixer 407. An output 104 of the mixer 407 is coupled to an MCM demodulator and FFT 415. Input 417 of the TT PLL is coupled as described in FIG. 1. The remainder of the circuitry of FIG. 3 is identical to the circuitry described in FIG. 1” as recited.

To further examine this claim, examiner is excluding “***an output coupled to an output of the training tone tracking circuit***” from claim 9.

- In regard claim 27, the specification does not teach “the multi-carrier modulation receiver is disposed as an integrated circuit upon the substrate by a CMOS process” as recited. The specification only discuss about “A current trend in circuit design is the increasing use of digital signal processing techniques (DSP) in implementing circuit designs. DSP is rapidly tending to replace the more conventional analog design techniques. Phase distortion, or phase errors,

typically arise in analog circuitry such as IF and RF tuners. Single carrier techniques typically utilizes a DSP technique of processing decision data in order to combat phase distortion. Decision data refers to the estimated value of a transmitted data sequence or symbol, based on received data." as recited from page 10-11.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 1, 3, 7, 9, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art of the instant application in view of Dapper et al. (US6,275,990).

- In regard claim 1, the admitted prior art of the instant application discloses a MCM transceiver comprising time domain down converting the received multi-carrier signal to base-band to provide a down-converted signal (Fig.1 element 125), the down-converted signal including a plurality of data tones for transmitting data and training tones for carrier phase error correction (Fig.1 element 117); sampling a training tone of the down-converted signal to provide received data samples (Fig.1 element 131) except specifically teaching that

providing a reference signal derived from the training tone of the down-converted signal; and estimating phase errors from a phase difference between the training tone and the reference signal derived from the training tone of the down-converted signal to provide a plurality of received sample phase error estimates for each data tone.

Dapper et al. discloses a bi-directional multipoint-to-point communication system providing a reference signal derived from the training tone of the down-converted signal (Fig.6 and column 27 line 37 – column 28 line 43); and estimating phase errors from a phase difference between the training tone and the reference signal derived from the training tone of the down-converted signal to provide a plurality of received sample phase error estimates for each data tone (Fig.6 and column 27 line 37 – column 28 line 43) in order to have advantage that unacceptable modification of the OFDM upstream signal by frequency shifters are thus avoided.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the admitted prior art of the instant application's multi-carrier transceiver in view of Dapper's disclosure in order to have advantage that unacceptable modification of the OFDM upstream signal by frequency shifters are thus avoided.

- In regard claim 3, the admitted prior art of the instant application discloses a MCM transceiver comprising time domain down-converting the received multi-carrier signal to base-band to provide a down-converted signal (Fig.1

element 125), the down-converted signal including a plurality of data tones for transmitting data and training tones for carrier phase error correction (Fig.1 element 117); and frequency domain converting a compensated down-converted received multi-carrier signal for further digital signal processing (Fig.1 element 137) except specifically teaching time-domain down-converting each of the plurality of training tones to base-band to provide time-domain phase samples of each training tone; providing a reference signal derived from the training tone of the down converted signal; estimating time domain phase errors from a phase difference between the time-domain phase samples of each training tone and the reference signal derived from the training tones of the down-converted signal to provide a plurality of time domain received sample phase error estimates for each time-domain received data sample of the received multi-carrier signal; coherently combining the time domain received sample phase error estimates of each of the plurality of training tones to provide a single coherently combined time-domain phase error estimate; applying the single coherently combined time-domain phase error estimate to the time-domain down-converted received multi-carrier signal to compensate for MCM signal frequency and phase errors. Dapper et al. discloses a bi-directional multipoint-to-point communication system comprising time-domain down-converting each of the plurality of training tones to base-band to provide time-domain phase samples of each training tone ((Fig.6 and column 27 line 37 – column 28 line 43)); providing a reference signal derived from the training tone of the down converted signal (Fig.6 and column 27 line 37

– column 28 line 43); estimating time domain phase errors from a phase difference between the time-domain phase samples of each training tone and the reference signal derived from the training tones of the down-converted signal to provide a plurality of time domain received sample phase error estimates for each time-domain received data sample of the received multi-carrier signal (Fig.6 and column 27 line 37 – column 28 line 43); coherently combining the time domain received sample phase error estimates of each of the plurality of training tones to provide a single coherently combined time-domain phase error estimate (Fig.4 element 33); applying the single coherently combined time-domain phase error estimate to the time-domain down-converted received multi-carrier signal to compensate for MCM signal frequency and phase errors (Fig.5) in order to facilitate the bi-directional multipoint-to-point communication for sending payload information over a distribution systems.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the admitted prior art of the instant application's multi-carrier transceiver in view of Dapper's disclosure in order to facilitate the bi-directional multipoint-to-point communication for sending payload information over a distribution systems.

- In regard claim 7, which is a system claim related to claim 1, all limitation is contained in claim 1. The explanation of all the limitation is already addressed in the above paragraph.

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- In regard claim 9, which is rejected as addressed in the above paragraph, has been examined without the limitation of "***an output coupled to an output of the training tone tracking circuit***" as recited. The limitation of a training tone tracking PLL having an input coupled to a training tone tracking circuit input can further be taught by Dapper et al. in Fig.6 elements 712, 714, and 716; and a multiplier having a first input coupled to the output of the training tone tracking PLL, a second input coupled to the training tone tracking circuit input can further be taught by Dapper et al. in Fig.6 element 718.
- In regard claim 10, all limitation can further be taught by Dapper et al. in Fig.33 elements 338, 341, and 340 and 355.

11. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art of the instant application in view of Dapper et al. (US6,275,990) and further in view of Doblar (US6,359,945).

- In regard claim 11 and 12, the admitted prior art of the instant application and Dapper et al. discloses all limitation as described in claim 9 and 10 except specifically teaching that PLL includes a second order phase locked loop with a first order loop filter.

Doblar discloses a phase locked loop including a second order phase locked loop with a first order loop filter (Fig.1 and 2, and column 1 line 29 – column 3 line 26 in order to gain complete control of loop parameters such as bandwidth, noise characteristics and speed.

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It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the admitted prior art of the instant application and Dapper's modified MCM transceiver in view of Doblar's disclosure in order to gain complete control of loop parameters such as bandwidth, noise characteristics and speed.

Allowable Subject Matter

12. Claims 4-6 are allowed.
13. Claims 13-26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

14. Reference US6,721,337 and US5,815,529 are cited because they are put pertinent to the MCM receiver and phase error estimation. However, none of references teach detailed connection as recited in claim.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ted M Wang whose telephone number is (703) 305-0373. The examiner can normally be reached on 8:30 a.m. - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Chin can be reached on (703) 305-4714. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 306-0377.

Ted M Wang
Examiner
Art Unit 2634

Ted M. Wang



STEPHEN CHIN
SUPERVISORY PATENT EXAMINER
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